

Space News

ROUNDUP!

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

JULY 25, 1962

Schirra Announces Spacecraft Changes Via Telstar

Emphasis To Be Placed On Lunar Orbit Method

NASA has announced that lunar orbit rendezvous (LOR) will be the prime mission mode for the Apollo manned lunar exploration program, using the advanced Saturn C-5 as the booster. Saturn C-5 can launch 45 tons to escape velocity.

The next phase of NASA planning, research, development and procurement will concentrate on LOR, one of three possible methods of putting astronauts on the moon. The other two are the direct earth-to-moon-surface flight, and the earth orbit rendezvous.

Studies of the earth-orbit rendezvous method, using the advanced Saturn with a two-man spacecraft, will be continued, as will studies of a direct flight to the moon, using such a spacecraft and the advanced Saturn. But prime emphasis will now be placed on lunar orbit rendezvous.

Studies of the Nova launch vehicle, with a weight lifting capability of at least two to three times that of Saturn C-5, will be continued but development has been deferred at least two years. Such a booster could be used for possible missions beyond Apollo.

"We are putting major emphasis on lunar orbit rendezvous because a year of intensive study indicates that it is most desirable from the standpoints of time, cost and mission accomplishment," NASA administrator James E. Webb said. "However, we have also acted to retain the degree of flexibility vital to a research and development program of this magnitude. Many of the modules and booster stages are interchangeable between the various modes open to us. If what we learn in the future dictates a further change in direction, we will be in a position to make it."

In connection with the decision to concentrate on LOR, NASA is requesting industrial proposals for the development of a lunar excursion vehicle, nicknamed a "bug," which will be carried aboard the Saturn booster with the Apollo mother craft as it is launched into orbit around the moon. The "bug" will be capable of landing two men on the lunar surface and returning them to the mother craft while a third crewman remains on board the Apollo spacecraft in lunar orbit.

Plans call for the use of a two-stage Saturn (configuration C-1B) using the present eight-

engine Saturn first stage, and the high energy S-IVB stage already under development, for early flight tests in earth orbit in the mid-1960's. These flight tests will be utilized to perfect maneuvers in earth orbit with minimal fuel loads. Saturn C-1B will develop sufficient thrust to put 16 tons into earth orbit. Saturn C-5 will put 120 tons into earth orbit.

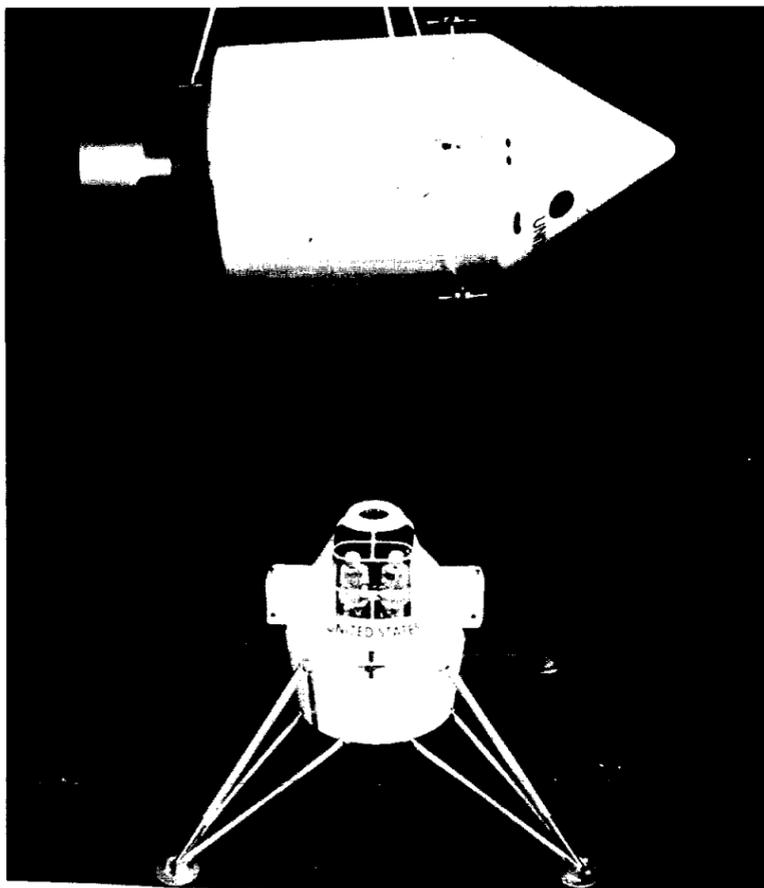
An in-depth study of an unmanned lunar logistic vehicle to support the lunar exploration program will be begun immediately.

Members of NASA's Manned Space Flight Management Council, under the chairmanship of Manned Space Flight Director D. Brainerd Holmes, recommended LOR unanimously for four reasons. It provides a higher probability of mission success with equal safety some months earlier than other modes, and within the national goal period of this decade. It will cost 10 to 15 per cent less than other modes, and requires the least amount of technical development beyond existing commitments.

The Council is composed of the directors of the Office of Manned Space Flight in Washington, D. C. headed by Holmes; MSC here in Houston headed by Dr. R. R. Gilruth; Launch Operations Center at Cape Canaveral headed by Dr. Kurt Debus; and Marshall Space Flight Center in Huntsville, Ala. under Dr. Wernher Von Braun.

As presently envisioned, LOR would require a single launch of a Saturn C-5 boosting a 13-foot diameter, three module spacecraft. The spacecraft would include a five-ton, 12-foot tall command module housing the three crewmen; a 23-ton, 23-foot tall service module providing mid-course correction and return-to-earth propulsion; and a 15-ton, 20-foot tall lunar excursion vehicle. The three modules would be placed in lunar orbit as a unit. Two astronauts would then transfer to the lunar excursion vehicle and descend to the moon while the Apollo

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PRESENT CONCEPTION of landing on the moon using the lunar orbit rendezvous method, now designated the prime mode for Project Apollo, will include an excursion vehicle (shown here in small model form) with two astronauts aboard descending to the surface as the command and service modules remain above in lunar orbit. (See additional pictures on page 3.)

Slayton Is Grounded From Mercury Flights

Donald K. (Deke) Slayton, the Mercury astronaut with a heart irregularity that kept him from making the last orbital flight has been grounded from the Mercury flight program, as of July 12.

"Naturally, I am greatly disappointed. For more than three years I have been training and looking forward to an early flight assignment. But I am ready to do whatever is needed," Slayton commented from his hometown of Sparta, Wisconsin where he was on vacation.

Slayton will continue to participate in astronaut training programs and Special Assistant Paul E. Purser, who made the announcement, would not rule out the possibility that Slayton might be included in a two or three-man flight.

The doctors decided that the stresses would be too great for Slayton to undertake solo flights, Purser said.

When asked if the decision meant that Slayton would never fly in a spacecraft, Purser replied "not necessarily."

His ailment is known as atrial fibrillation, a periodic lack of rhythm in the heart

action, and is not considered serious from a health standpoint.

Slayton and the Air Force have known about it since 1959, before he was selected for the space flight program by

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Astronaut Donald K. Slayton

The space age turned one of its more spectacular sides to view Monday afternoon as Astronaut Wally Schirra, soon to orbit the earth, spoke to the better part of its people via a package of electronics which was already doing so.

Part of the 45-minute show on Americana which was broadcast through American Telephone and Telegraph's experimental communications satellite, Telstar, was devoted to changes in the Mercury spacecraft which will lift Schirra into orbit late in September.

The program was beamed to most countries of the world, with the exception of Japan.

One day soon, via Telstar perhaps, the nations of Europe will join us for a live coverage of a man in orbit.

Schirra was speaking from Hangar S at Cape Canaveral, where he is hard at work on preparations for the MA-8 mission.

"My flight plan calls for up to six orbits . . . nine hours in space," Schirra explained. "There are only a few equipment changes.

"We were able to take out a radio transmitter and receiver by making the main command radio do double duty and work on earth as well as in space. We added a new antenna to make it work better. I also have a new small radio to use from a life raft if I decide to leave the spacecraft while waiting to be picked up."

America's last astronaut in space, M. Scott Carpenter, was out of touch for some 45 minutes after his spacecraft splashed down in the Atlantic. He floated in a one-man life-raft beside the spacecraft for three hours before he was picked up. "We put a sofar bomb back in to sound off on landing and help recovery forces locate me sooner," Schirra said.

"There are a couple of control circuit changes," he added, "parachute wiring for one, and a new switch to insure against using too much fuel during flight for another."

Carpenter's flight was hampered by a shortage of fuel for the attitude control rockets which at one point was considered serious.

Schirra will take with him

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Friendship 7 Gets Rousing Reception

G. Merritt Preston, Manager of Cape Operations and Chief of the Preflight Operations Division for NASA's Manned Spacecraft Center, returned recently from a tour of duty as NASA representative with the Friendship 7 spacecraft.

The spacecraft which carried Astronaut John H. Glenn, Jr., on his history making flight is currently on the final legs of its world-wide tour.

Preston, who accompanied the spacecraft to Karachi, Pakistan; Bombay, India; Colombo, Ceylon; and Rangoon, Burma, was amazed at the reception given the event, the interest exhibited by the people and their apparent familiarity with the space flight.

He emphasized that much was accomplished by the tour in addition to showing the Friendship 7 to the peoples of other countries. During his stay in the aforementioned countries, Preston was required to spend many working days which extended to 18 hours and longer—days which were made shorter by the realization of the good being done.

The highlight of the trip was the reception accorded the arrival of the exhibit at Bombay. At that city, more than one million people lined both sides of the street for 25 miles.

In Bombay, while the exhibit was open, the line to see the spacecraft was eight city blocks long and it took those waiting approximately five hours to get a six-second glance at the craft.

Preston admitted freely that there were frequent lighter

Slayton Grounded From Solo Flight

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National Aeronautics and Space Administration officials.

Slayton himself has discounted it but the heart irregularity stopped him from being the second man in space and eliminated him from the last orbital flight that was conducted by Malcolm Scott Carpenter.

He has been examined by NASA doctors, a group of Air Force doctors and Dr. Paul Dudley White, an internationally known heart specialist.

Purser said that the conclusion that the stresses would be too great "represents the consensus of all the medical specialists involved."

The announcement emphasized that Slayton's general health is excellent.

"I would be happy to have Slayton on our team in any capacity, and I know he will be making new and perhaps more important contributions to our program in his new capacity," Director Robert R. Gilruth said.

Slayton will continue to work on the Mercury (one-man orbital flights), Gemini (two-man orbital flights) and Apollo (three-man moon flights) projects, Purser said.

moments along with the hard work on the strenuous trip. For instance, he found that in Karachi, the now-famous camel driver for Vice President Johnson holds a daily conference in front of the U. S. Embassy, at which time he grants interviews and signs autographs.

He also cited an incident in Rangoon which he classified as one of comic-terror. The iron gates surrounding the exhibit area were only opened about a foot in an endeavor to accommodate the crowd only in single file. The anxious crowd foiled this attempt in a mob scene as they crowded around the opening with such vigor that it was impossible for those in front to get through. Preston said, "they wound up to being three deep at the gate, some on their hands and knees, others standing on them, some holding babes in arms. Police inside the gate tried to assist by helping to pull those closest inside with a resultant loss of clothing in many instances. Another group of about 3,000 circumvented the problem by scaling the fence to gain admittance as they followed a small group of persons in distinctive garb 'over the top.' Once inside they straightened their clothing, smiled and were very polite."

Preston added that in Rangoon the exhibit was set up in a manner that two lines of persons could view the Friendship 7 at the same time, one which would allow them to look into the capsule from close up, another which would permit a view from a raised platform and might really permit a better overall view of the exhibit. Long lines formed in both cases but when the people arrived at the foot of the stairs for the raised view they dropped out and went to the end of the other line in order that they might work their way forward and touch the spacecraft as they passed.

Among the interesting persons Preston met on the trip was Arthur Clark, a successful British space science fiction writer. Clark had just returned to Ceylon from an American Rocket Society meeting in New York and had served as a panel moderator.

Since there were many demands upon Preston's time, a system was worked out to use local students in answering the many routine questions by those viewing the exhibit. At each stop a group of these students were briefed thoroughly and accepted the assignment with much enthusiasm. This permitted Preston to make appearances at universities and before important local groups to explain in

Changes In Schirra Mission Equipment Are Revealed

(Continued from Page 1)

special shingles coated with five kinds of material being researched for possible use in heat shields.

He will carry two radiation packs of a new design from the Goddard Research Laboratory, to give us new information on what could be a hazard to men in the future as

Beech Will Build Gas Storage Tanks For Apollo Craft

Beech Aircraft Corp. of Wichita, Kansas, has been selected to build the super critical gas storage system for the National Aeronautics and Space Administration's Apollo spacecraft.

North American Aviation's Space and Information Systems Division, Downey, Calif. principal Apollo spacecraft contractor for MSC, said the contract will be for an estimated \$4 million. Work on the system will be performed at Beech Aircraft's Boulder, Colo. facility.

The system is part of the spacecraft's environmental control and electrical power systems and consists of a series of pressure tanks, heat exchangers, and valving. It stores the oxygen and nitrogen for the Apollo crew, and the hydrogen and oxygen fuel for the operation of the spacecraft's electrical power systems.

greater detail the missions and objectives of America's space program.

In each case, Preston wrote to the students concerned and thanked them for their help during the exhibitions. These letters have had a profound impact and Preston is already receiving fan mail as a result. For example, Manzoor Ahmad of Karachi wrote: "I am in receipt of your favour of June 22, 1962 appreciating my humble work in connection with the National Aeronautical and Space Exhibition in Karachi. While I thank you for your kindness, I cannot help saying that whatever I did I did as a part of my duty to promote the cause of cooperation between the two countries and never deserve this high appreciation of yours. However, as I am a student of Hamia Talim-e-Milli College, Malir City, I value this letter and consider it a boon from heaven as I hope that this will improve my future career in life."

Preston re-emphasized that the value of the tour of the spacecraft and the accompanying good will which has resulted is inconceivable. He pointed out that among those observing the spacecraft during his stay with it were the local Communist leaders—leaders who looked at the Friendship 7 and offered no comments.

they fly in deep space.

Finally the periscope on the Mercury spacecraft has been removed and a camera with a special lens put inside, so that he can take ultra-violet photographs of star systems in clear space. Here on earth, the atmosphere screens out most ultra violet rays.

"These should give the scientists of the world more information about the universe around us."

Astronaut John Glenn, first man to orbit the earth, also had a part in the Telstar television broadcast.

From the first flight we needed to confirm that a man could, in fact, perform useful tasks in space, he said. Next, with Astronaut Scott Carpenter we began to apply man's talents as a scientific observer. Now, with Wally Schirra's mission, we begin to expand the period of time in space.

To date, we have learned enough to decide that the astronaut is, in practice a primary spacecraft system capable of taking over a number of functions for which we formerly used mechanical equipment. We have evolved to the stage where now we can begin to use men instead of machines in some cases.

"These flights are transitional, evolutionary, leading us toward the one-day missions we expect to start flying next year, from there into Project Gemini, which will put two men into space for periods up to a week, and finally Apollo, our three-man spacecraft that will take us to the moon and back."

Wallops Station Launches Aerobee

The National Aeronautics and Space Administration launched a scientific experiment from its Wallops Station, Wallops Island, Va. recently to discover previously unobserved spectral emission lines in our upper atmosphere and to measure their intensity as a function of altitude, thus determining the distribution of certain molecular and atomic species in the upper atmosphere.

The Aerobee research rocket was used to launch the experiment and reached an altitude of approximately 130 statute miles. Weight of the payload was 185 pounds. Impact occurred in the Atlantic Ocean approximately 111 statute miles from the launch site and no attempt was made to recover the payload.

Information obtained from the experiment will be forwarded for analysis to NASA's Goddard Space Flight Center, Greenbelt, Maryland, and The Johns Hopkins University, Baltimore, Maryland, where the experiment was designed.

LOR Rendezvous Method Is Chosen

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mother craft (command and service modules) remains in lunar orbit.

After a period of exploration extending up to four days, the two men would use the lunar excursion vehicle to ascend from the moon to a rendezvous with the mother craft still in orbit. They would transfer to the mother craft, and the lunar excursion vehicle would be jettisoned.

The command module would be boosted back toward earth by the service module with an engine generating 20,000 pounds of thrust. Just before entering the earth's atmosphere, the service module would be jettisoned.

The Apollo LOR configuration and its Saturn C-5 booster would stand about 325 feet tall and weigh six million pounds at launch (3,000 tons). The first stage will be powered by five F-1 engines generating 7.5 million pounds of thrust; the second by five hydrogen-oxygen J-2 engines, each generating 200,000 pounds of thrust; the third by a single J-2 engine. All elements of this launch vehicle are currently under contract.

Using command and service modules now under development, earth-orbit rendezvous would require the additional development of two propulsion modules weighing about 50 tons—a lunar braking module and a lunar touchdown module—in order to decelerate the 28-ton command and service modules to a soft landing on the moon.

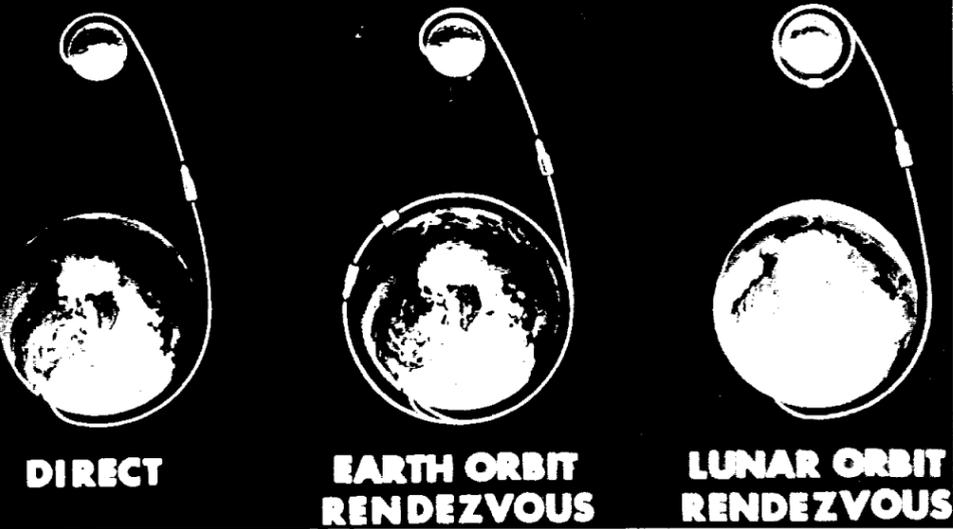
Earth-orbit rendezvous is currently conceived as meaning that each mission would require earth launchings of two or more advanced Saturns. One would boost into orbit a 60-foot liquid oxygen tanker weighing 110 tons. A separately launched spacecraft attached to a fueled but unloxed third stage of an advanced Saturn would rendezvous with it, the lox would be transferred and the third stage would then power the spacecraft to the moon.

A three-man direct flight would have the same requirements as earth orbital rendezvous for the command and service modules and the lunar braking and touchdown stages, and in addition would require the immediate development of the Nova vehicle with a 12-million pound thrust first stage and upper stages employing the 1.2 million pound thrust hydrogen-oxygen M-1 engines.

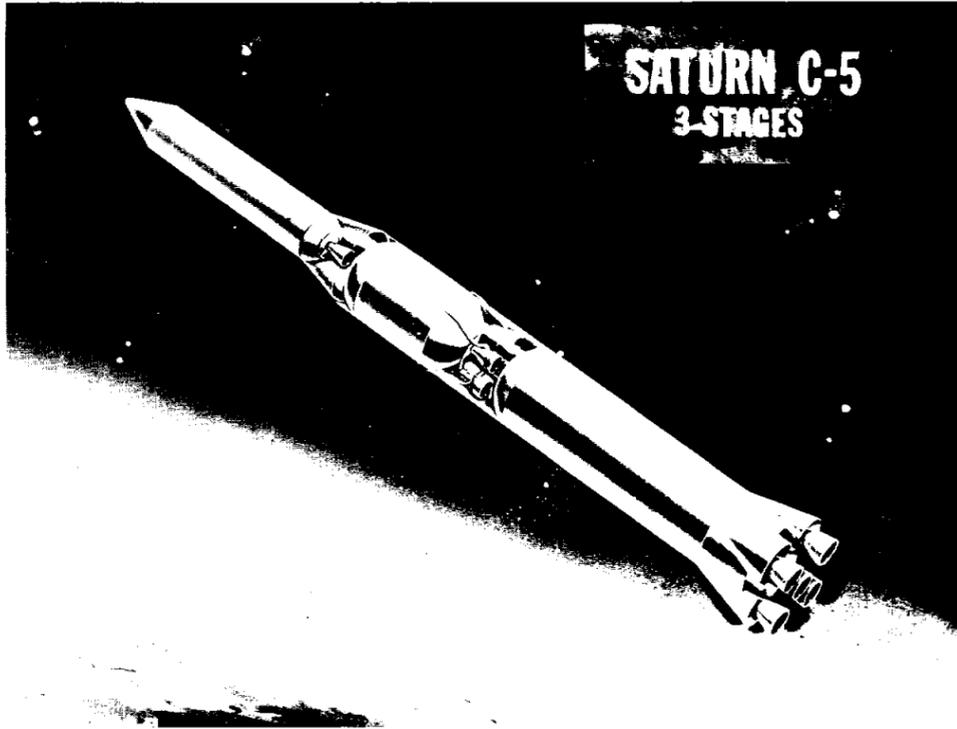
A similar experiment to obtain the same type of data under daytime conditions was scheduled.

Mr. W. G. Fastie of Johns Hopkins University is the Project Scientist for these experiments; Jon R. Busse is the Goddard Vehicle Manager; and Robert T. Long is the Wallops Project Engineer.

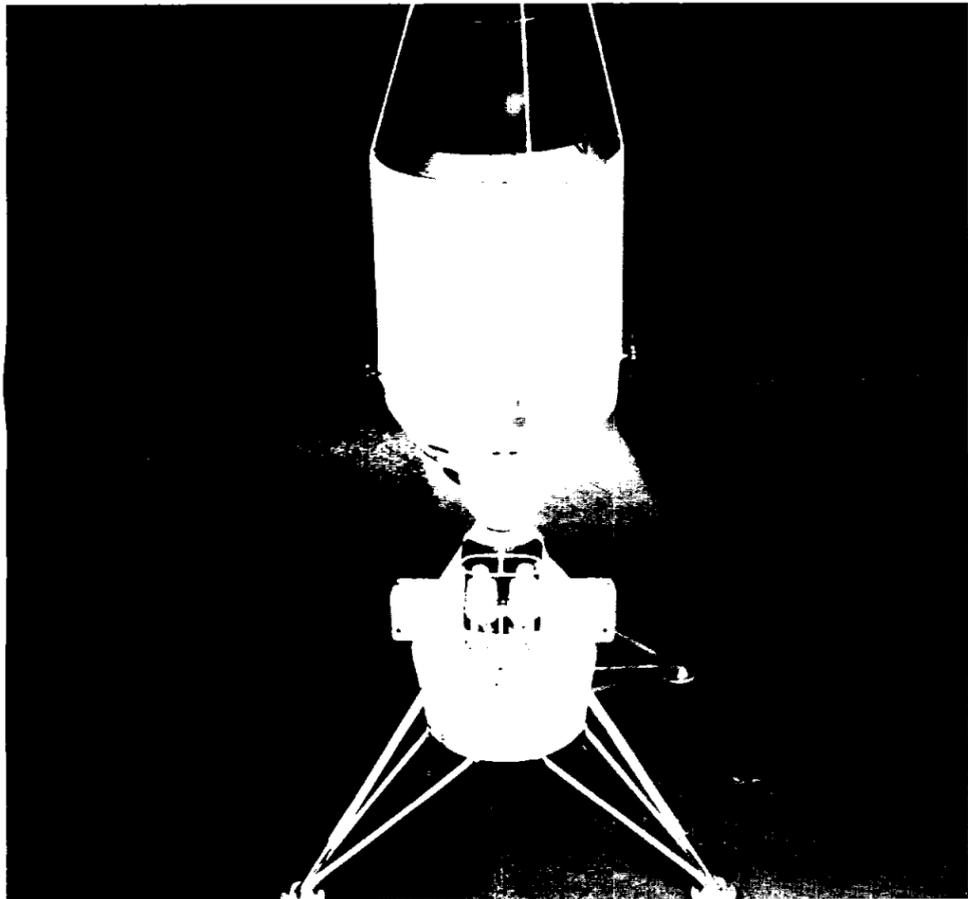
PROJECT APOLLO LUNAR LANDING FLIGHT TECHNIQUES



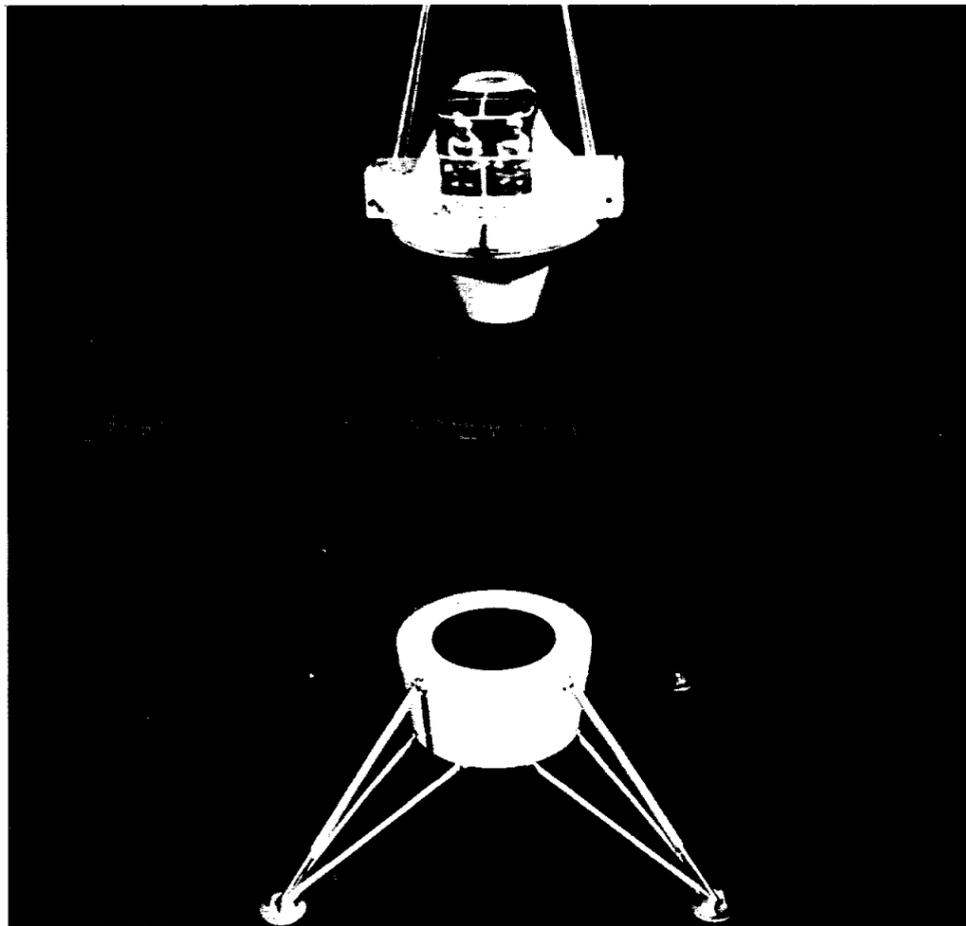
THREE POSSIBLE METHODS of achieving lunar landing include a direct earth-to-moon flight (left), the joining of two separately launched Saturns in earth orbit, one containing the necessary liquid oxygen fuel for proceeding to the moon and the other the Apollo spacecraft; and the one-launching lunar orbit method, now designated the prime mode. (See story on page 1.)



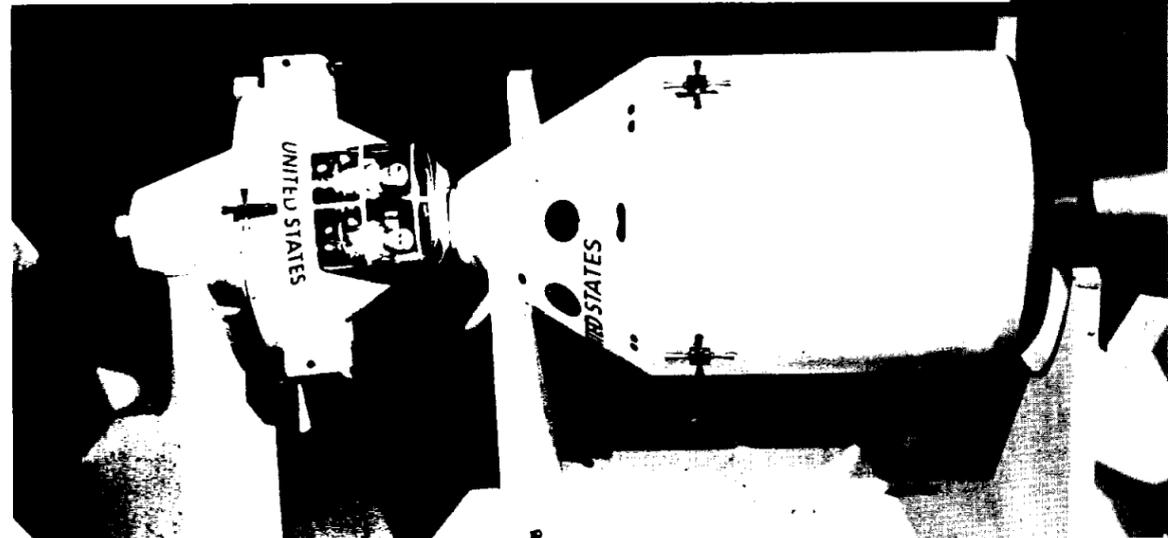
ARTIST'S CONCEPTION of the Saturn C-5 booster designated for use in LOR. This would boost a 13-foot three-module spacecraft including a five-ton command module, a 23-ton service module and a 15-ton lunar excursion module.



THIS IS THE GENERAL CONFIGURATION of the command-plus-service module (top unit) and the lunar excursion module (with legs) after achieving lunar orbit and turnaround. The Saturn booster has been jettisoned. The excursion vehicle with two astronauts is now ready to descend to the surface of the moon, leaving the command and service modules in lunar orbit with one astronaut.



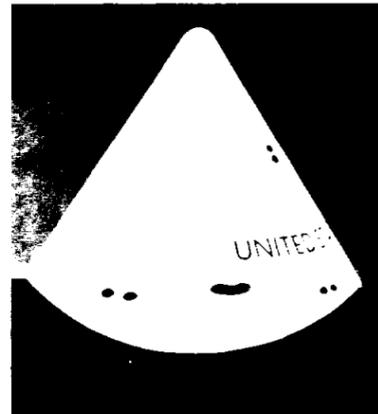
AFTER EXPLORING the lunar surface (see photo on page 1) the excursion module will lift away from the moon, leaving its base structure (legs) behind, and return to the command-and-service module still in lunar orbit.



LUNAR ORBIT RENDEZVOUS itself takes place when the excursion vehicle rejoins the command-and-service modules in lunar orbit. After the two astronauts exit the excursion vehicle and get aboard the command module (cone-shaped top of unit at right) the excursion vehicle will be jettisoned.



THIS IS THE PART that will leave lunar orbit and start back to earth. Fuel for the return trip is contained in the cylinder-shaped service module, the three astronauts in the cone-like Apollo spacecraft at the top.



AFTER THE SERVICE MODULE is jettisoned, the Apollo spacecraft will look something like this on "the long trip home," all that is left of the huge booster-and-payload configuration which began the trip. The service module will be dropped as soon as it has furnished sufficient thrust to push the spacecraft out of lunar orbit into a long fall toward earth.



JACQUES TIZIOU OF PARIS was welcomed to MSC by Paul E. Purser, Special Assistant to the Director on Friday, July 13. Tiziou was visiting MSC as part of a tour of NASA facilities in the eastern and southwestern United States. Tiziou, an aeronautical engineer, is in the States to write a series of articles on NASA for *Air Revue*, an aeronautical magazine in Paris. While at MSC, he interviewed Purser, Charles Frick, Martin Byrnes, Homer Dotts, and Dave Lang.

McDonnell Gave Capsule Lots Of 'TLC' Says Carpenter

Astronaut Malcolm Scott Carpenter, in St. Louis, Mo. for the first time since his space flight May 24, thanked employees of McDonnell Aircraft Corp. last week for their "tender, loving care" of his spacecraft.

Speaking over the plant loudspeaker during a rest period, the astronaut expressed

Boating Enthusiasts In MSC Offered Navigation Classes

Free classes in navigation, small boat handling, and safety at sea will be offered to the public by the Galveston Bay Power Squadron. Registration will be held 7:00 p.m., Thursday, Sept. 13, at the Marine Biological Laboratory of the Fish and Wildlife Service, Building A, 2nd floor, Fort Crockett, Galveston.

The course consists of 14 weekly lectures. Subjects covered include rules of the nautical road, equipment required by law, seamanship, the compass, and chartwork. An examination concludes the course. Classes are open to men and women, regardless of whether or not they own a boat.

All persons interested in getting more enjoyment and safety while afloat are encouraged to register and take this free course of instruction. Please write or call P/C R. M. Sinclair, JN, P. O. Box 12494, Houston 17, phone MI 4-5559, or call P/C D. J. Dousman, AP, Galveston SH 4-9175, for additional information.

Barney A. Myatt, of 8280 Park Place, Houston 17, is Commander of the Galveston Bay Power Squadron, which is one of 317 squadrons, each a unit of the United States Power Squadrons.

his "deep debt of gratitude to all of the people who made Aurora 7 possible."

The corporation presented Carpenter with a one-tenth scale model of the Aurora 7 capsule in which he made his historic three orbits of the earth. The spacecraft and its escape tower, 21 feet high, were manufactured at McDonnell.

The astronaut went to St. Louis for an all-day session with McDonnell personnel working on Projects Mercury and Gemini.

J. S. McDonnell, president of McDonnell Aircraft, Walter F. Burke, vice president and general manager for Mercury-Gemini, and Carpenter stood in front of the Aurora 7 spacecraft to speak to McDonnell personnel. Their talks were repeated by tape during later rest periods to reach all the 23,000 McDonnell employees.

"I am very glad to have this opportunity to express to you personally my deep debt of gratitude to all of the people who made Aurora 7 possible," Carpenter said.

"I would like to give you this first-hand report that the spacecraft performed perfectly throughout the flight, as good evidence of the tender loving care that you all gave it here. I am deeply in your debt for the fine job you did."

It is a "great pleasure" to be associated with "such a fine group of people at McDonnell," he said.

Gemini Roll-Pitch-Yaw Panel To Include Simplified Reading

A spacecraft instrument to simplify flight attitude readings is being designed and built by the Instrument Division of Lear Siegler, Inc., for installation in the Gemini two-man orbiting and rendezvous vehicle.

Called a flight director-attitude indicator, this instrument concept will be the central control display for Gemini's crew. It will present on a single pictorial cockpit display information found on three separate displays on the Mercury spacecraft's instrument panel.

This single display indicates to the crew the spacecraft's attitude in roll, pitch and yaw throughout the flight and also shows corrections in attitude which must be made to perform certain maneuvers. Unlike those who have gone before them, Gemini astronauts will not be required to read three separate instruments (one each for roll, pitch and yaw) and from this information to compute their spacecraft's overall attitude in space. Instead, using the Lear Siegler display, they will see at a

glance the exact relation of the spacecraft to the horizon with no computation necessary, a feature that frees them for other flight duties. Proper alignment of the spacecraft's attitude in some phases of the flight will be essential to the safety of the crew.

The Lear Siegler central display will be the primary visual guide used by the astronauts for reference during launch, in preliminary and intermediate rendezvous maneuvers and at the critical time of reentry.

Similarly, in preparing the spacecraft for docking with the Agena B, the flight director-attitude indicator will tell the crew how to position the spacecraft for a precise lock-on to the Agena. On reentry, the crew will again depend on the indicator to keep the ship at the proper angle.

WELCOME ABOARD

Manned Spacecraft Center acquired 173 new employees between June 17 and July 12. The 16 listed for Preflight Operations, Cape Canaveral Administration, and Mercury Project Office will be stationed at Cape Canaveral; the rest here in Houston. The letters "RTD" after a name mean "returned to duty."

Mercury Project Office: Charles M. Vaughan.

Apollo Project Office: James M. Peacock, Billy D. Etherton, John G. Presnell, Jr., and Alfred G. Mardel (consultant).

Gemini Project Office: Mary J. Heffelfinger, William R. Wakeland, and Lillian Anderson.

Preflight Operations: Harry K. Hiers, George I. Webster, Robert H. Buckley, David A. Bauman, John F. Walter, Jr., Joseph B. Fitzsimmons (RTD), Leon Dugoff, Walter T. Norwich, Elizabeth D. Allen, Joseph D. Collner, Charles P. Elms, Terry Lamar Wilson.

Flight Operations: Donald E. Stullken, Alma A. Hurlbert, Kenneth A. Young, Harold B. Franklin, Charles W. Pace, Donald C. Brown, James P. Arnold, Arthur C. Bond, Jr.

Flight Crew Operations: Miles G. Springfield.

Systems Evaluation & Development: James P. Vincent, James S. Kelly, Allen D. Gist, Jesse R. Dull, Edward G. Burroughs, George W. H. Blundall, Jr., James L. Cioni, Robert B. West, Leland C. Norman, Robert L. Turner, George E. Griffith, William C. Schneider, Thomas Buckler (RTD), Paul E. Tilson (RTD), Jerome L. Winkler, Jr., Mary R. Barnes, Patricia J. Daniels, William N. King.

Life Systems: Gerald A. Lorenzen, Donald F. Price, John W. Shipman, Jaye C. Jarrett, Ellis N. Zuckerman, James H. O'Kane, Frank A. Burgett (RTD), Clifford W. Hess, Kenneth S. Snyder,

Donald R. Osgood, Lewis O. Casey, James J. Haven, Robert L. Jarboe, Howard D. Thames, Jr., Richard A. Klimaszewski, John Shipman, Ted Gutwein, James B. Moore, III, JoAnn P. Shumilak.

Cape Canaveral Administration: Juanita P. Thomas, Larry R. Clark.

Facilities: Stanley E. Wood, Jr.

Audit Office: Jack I. Shearin.

Spacecraft Research: Patricia A. Kelly, Ellis W. Henry, Kenneth Baker, John W. Dale, Ted Mendoza, Gerald S. Cyprus, Arthur M. Whitnah, Patrick B. Burchfield, Daniel A. Dansak, James V. Vanden Boosche, John W. Orsag, Stephen E. Hale, Arthur T. Hiemer, W. Walter Jaderlund, William H. Herrick, George W. Sandars, William E. Gandy, Allen C. Washburn, David S. McKellar, Larry P. Ratcliff, James R. Smith, David A. Dyer, Robert Bazhaw, Errol C. Wilkins.

Data Computation: Carroll B. Holley, Gary R. Barron, James A. Banks, Walter A. Bollfress, Mary S. Davis.

Steno Services: Ruth M. Deason, Nina P. Hight, Mary V. Moore, Lois M. Bradshaw, Arlene Hoffman, Mary G. Webber, Tina L. Dickson, Regenia A. Miller, Edna F. Fowler, Mary V. Moore, Carole D. Anderson, Patricia Williams.

Procurement: James P. Elstun, Cora E. Paine, George Elder, Mary A. Ray, Earline B.

Fogleman, Elna C. Rose, Jane E. Nevinger.

Personnel: Norvin C. Rodriguez, Earle B. Young, James T. Richards, Jr., Paul W. Liebhardt, Edward J. Clarke, Jerry A. Penno, Raymond F. Hassett, Mark A. Johnson, Anne Walker.

Public Affairs Office: Frankie Fisher.

Administrative Services: Paula T. Sturtevant, Bertha E. O'Brien, Marilyn C. Scarborough, Sherry A. Hicks, Judith W. Lingenfelter, Sandra A. Pace, Delio G. Colonna, Jr., Arthur L. Baer, Jr., Lewis R. Braun, Don L. Spann, Sharron K. Dunaway, Donald V. Coers, Albert C. Clerc, Jack G. Walker, Jr., Judith A. Mainard, Raymond S. Wilson, Stewart M. Kohler.

Logistics: Billy C. Marcontell, T. Marshall Wilker, Jr.

Technical Information: Kent M. Johnston, Clara-Jane Andrews.

Space Physics: Manuel D. Lopez, Jr., Gary L. Kraus.

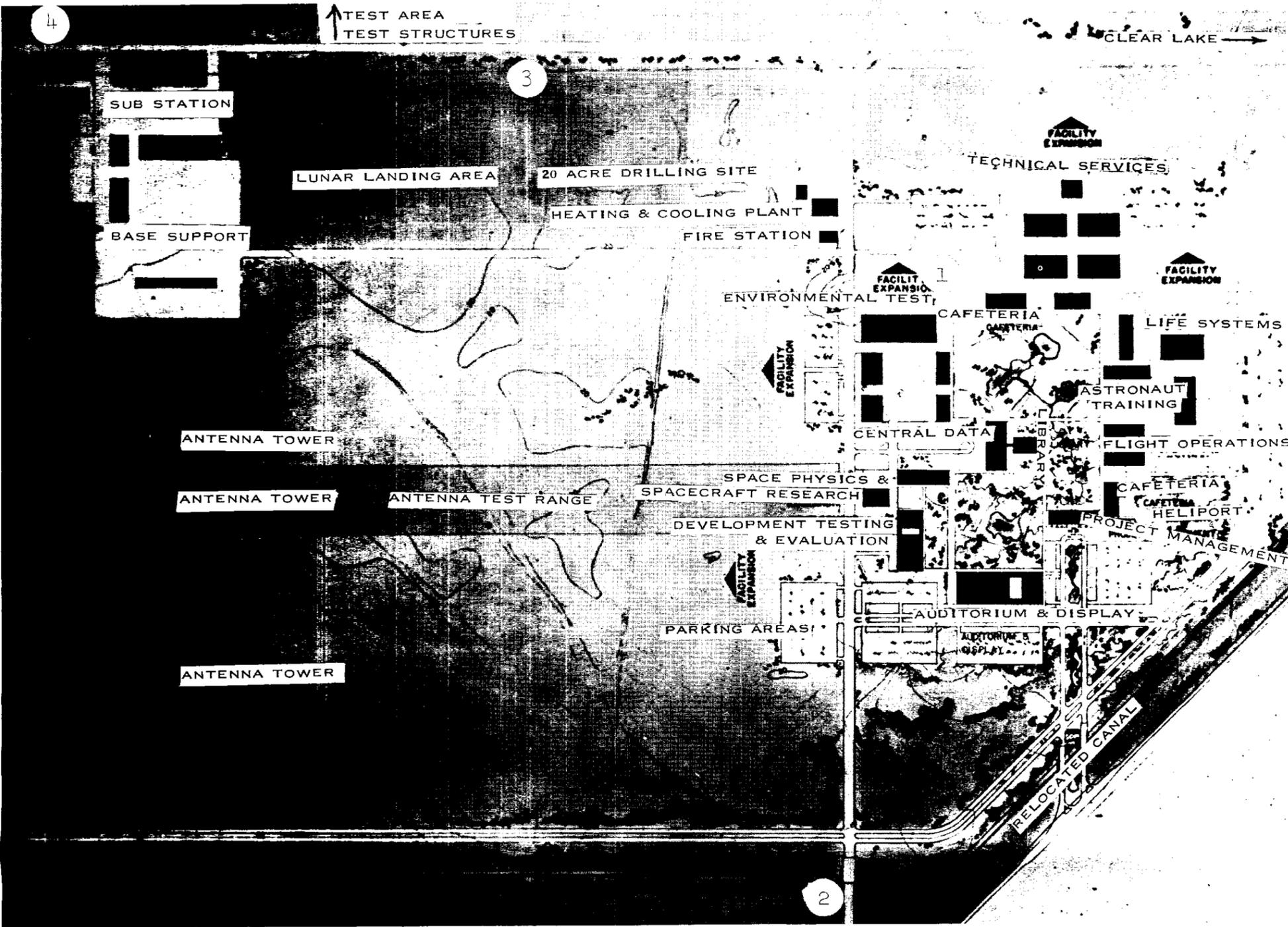
Technical Services: A. Morris Wolfe, Barney E. Mayfield, Robert C. Langendorfer, Emilio Rodriguez, Jr.

Photographic Services: Victor Rhoder, Virginia R. DeFoy.

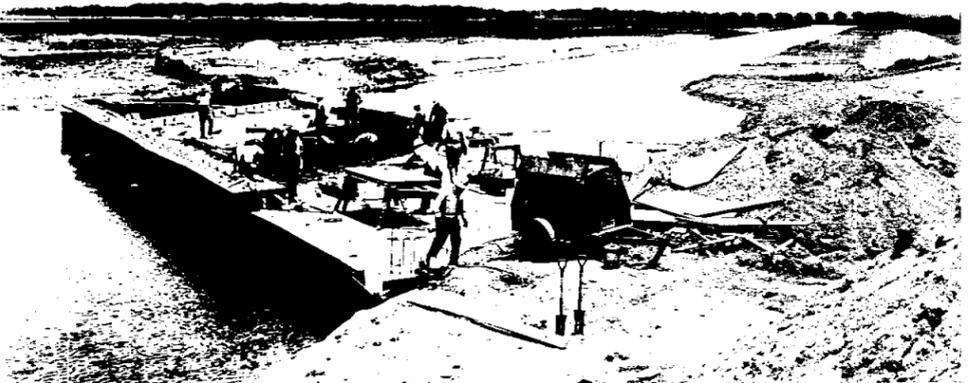
Financial Management: John F. Vittone, Clarence R. Young, Donald Meredith, Thomas L. Stanley, Jr., Leonard J. Pizalate.

Program Analysis Evaluation: Jimmie L. Gibbons, Roy W. Savell, David W. Camp.

Aerospace Medical Operations: Allen D. Catterson, Dr. Charles A. Berry, (Lt. Col., USAF)



Grounds map of Clear Lake site of Manned Spacecraft Center shows \$90 million complex of management buildings and laboratory facilities at right with the antenna range, lunar landing area, test area and base support structures at left. Numbered marks correspond with pictures below of work presently being done on the site.



THE SECOND STREET BRIDGE, shown here looking west, (No. 2) will be one of three bridges over the relocated canal which is being diverted from its former course through the center of the building area. The relocated section will loop around one edge of the site and is more than a mile long.



THE UTILIDOR, shown here looking east from stations four and 20, (No. 1) is a 7,000 foot zig-zag utility tunnel under the principal building area built of reinforced waterproof concrete and varying from six feet to 13 feet in width. It stands more than seven feet high. Along its walls will run the many lines for electricity, water, air-conditioning, etc. as well as various gases needed in laboratory research.



AN ELECTRICAL DUCT BANK is being constructed near Avenue B, (No. 3) one of a number of such circuits. More than a million cubic yards of earth are being moved for the 11 miles of utility lines and six miles of roads going into place on the site.



THIS IS THE FIRST RING of one of two ground storage water tanks being installed at the northwest corner of the site (No. 4). One will be of 2,500,000 gallon capacity and the other of 1,000,000 gallon capacity.

The **SPACE NEWS ROUNDUP**, an official publication of the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas, is published for MSC personnel by the Public Affairs Office.

Director **Robert R. Gilruth**
Public Affairs Officer . . . **John A. Powers**
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Editorial

Even in an age which is well-accustomed to scientific marvels, there is something special about the successful launching of Telstar, the "switchboard in the sky," at Cape Canaveral.

For this new satellite, built by private industry—the American Telephone & Telegraph Co.—and launched by government—the National Aeronautics and Space Administration—dramatizes with rare immediacy the changes to be wrought in our lives by the strides of space technology.

A new era has been opened in human communication. The launching of Telstar means that the continents will be linked together more closely and securely than ever. Stations in space will transmit signals with incredible speed, ease and accuracy around the globe, opening new pathways for intercontinental television, radio and telephone.

Telstar is an answer to those who have wondered what part private industry was going to play in forging the scientific advances of the future. It is an answer, too, to those who have wondered what practical, not to say immediate, benefits there were in man's forward surge into space.

Even as it races through space right now, the solitary space device of its type, Telstar has cut a new channel through the heavens for men to communicate with one another. And it is inevitable that within a short time there will be other Telstars girdling the globe, removing virtually all limits from men's ability to exchange words, ideas and thoughts with one another across the oceans, mountains and deserts that separate them physically.

America's new star in the skies bears one other indisputable and praise-worthy distinction. It is a work of peace. Telstar threatens no one, menaces no one, does not carry within itself the potential of disaster. It seeks to build, not to destroy.

All those who had a hand in putting it into space can view their work with satisfaction, and the country in which it was developed can present it to the world with pride. Indeed, perhaps we can all repeat today, in wonderment and gratitude, the words with which Samuel Morse more than a century ago inaugurated the telegraph age: "What hath God wrought!"

—New York Herald Tribune

U of H Football Schedules, Tickets And Maps Available

Football schedules and maps of the seating arrangement in the Rice Stadium for University of Houston football games are available in the MSC Relocation Center, in the East End State Bank Building. Mrs. Grace Winn, phone WA 8-2811, extension 4242-4243, will be glad to give you further information.

It is suggested that if a group would care to have season tickets reserved that a block might be reserved for the group. In this way, NASA will

be able to get a preference of seating. The deadline on group reservation will be Aug. 10. If you care to see just one or two games, call earlier so these arrangements can be made as soon as possible. The season reserved tickets are \$20.00, and the box seats reserved are \$25.00. Single reserved tickets are \$4.00.

This would be admission to five games, Sept. 22, with Baylor University, 8:00 pm; Sept. 29, with Texas A and M, 8:00 pm; Oct. 20, with Missis-

EDITORIAL EXCERPTS

Washington Post
July 12, 1962

TELSTAR: A SCIENTIST'S GRANDCHILD

NEW YORK, July 11 (AP) A man who once wrote science fiction as a hobby conceived the Telstar communications satellite.

He hopes it will lead to better understanding between peoples of the world, and peace.

He is John Robinson Pierce, 52-year old director of research in communications at the Bell Telephone laboratories.

Pierce describes the satellite as his "grandchild," rather than a "brainchild."

The "brainchild," he says, was the Echo satellite put into orbit two years ago. It is a 100-foot plastic balloon and was the first satellite to be used to bounce signals from one part of the earth to another.

Oddly enough, Pierce had forgotten he predicted in August, 1960, when Echo proved successful, that transoceanic television was "around two years away."

Commenting on the success of Telstar, the tall research scientist remarked that "I feel pretty good." Speaking at his laboratory at Murray Hill, N. J., Pierce went on to say:

"Communications satellites will be an important part of space activities for a long time to come . . .

"One way to unify the world is through the United Nations but communication is another method—outside the political world—which puts peace on a direct personal appeal basis.

"This is our real hope for the future."

Associates describe Pierce as extremely modest and say he often is quite "intense."

"He even composed music for computers," one of his colleagues said, "but it's brilliant . . . we never take him lightly . . . at work or play."

Another major figure in the Telstar development—Eugene Frank O'Neill, an engineer, with the Bell laboratories for 21 of his 44 years—has been "eating, sleeping and drinking" the Telstar project for two years.

O'Neill, director of the American Telephone and Telegraph Co. project to put a communications satellite in orbit, is the stocky son of a Brooklyn milkman.

His head is full of calculations, but his friends find him not a walking mathematical machine, but a warm and humorous man.

Mississippi University, 8:00 pm; Nov. 10, with Tulsa University, 2:00 pm; Dec. 1, with Cincinnati University, 2:00 pm.

All University of Houston games are played in the Rice Stadium on Rice Boulevard, on Saturdays.

MSC PERSONALITY

'Just Didn't Believe It,' Says Financial Mgt. Head Rex Ray

"I got to reading about this moon business, and I just didn't believe it," said Financial Management Chief Rex L. Ray. "The only way to find out if there was anything to it was to get in on it. And here I am."

That's a super condensation of the 41-year career which began when Ray at the age of 15 took a job as a messenger boy for the Treasury Department: salary, \$360 per year.

"The story of my life," quips Ray, "from government messenger boy to government messenger boy in 41 years."

That's not quite true, inasmuch as Financial Management Division holds the purse strings of Manned Spacecraft Center and disburses everything from money for paper clips to the spacecraft which will eventually land Americans on the moon.

But to hear Ray tell it, there's nothing to it. "We have 64 personnel now and I hope to have 100 in time," he said, pull-



Rex L. Ray

ing out an elaborate organizational chart. "We're trying to get top calibre men. I think there should be only one lunkhead in the crowd—me."

The "lunkhead" could read and "figure" at the age of three, under the tutelage of his father, who taught a one-room school some 50 miles from Murphy in the mountains of North Carolina. He entered formal classes at the age of seven, starting in the fourth grade, and graduated from the eighth by the age of 11 having had algebra, plane geometry, and basic Latin. At that time his father moved the family to Washington, D. C. to give young Rex a chance at further education, but, says Ray, "I crossed him up. After three years of high school I decided I was smart enough."

There is evidence that he was entirely correct. Congress passed a bonus to raise the salary of messenger boys to \$600 a year, the same thing the grown-up messengers got, but in 1925 Ray saw greener pastures in private industry and went to work as an agent for Metropolitan Life Insurance Company. He worked for a sand and gravel firm as bookkeeper, then in 1930 as branch accounting manager for Wilson and Company in Wilmington, Del. In 1935 he moved back to

Washington as salesman and general manager of Jack Pry Motors. Five years later, in 1940, he "saw a war coming" and went back into government service with the Department of the Navy, as chief civilian in the Kearney, N. J. shipyard.

"Since that time," he comments, "I have had my nose in the public trough."

In 1945 he joined the Maritime Commission as chief of the contract termination group, and six months later went to the Office of Price Administration in charge of field examinations for the meat industry. Later he handled meat subsidy audits with Reconstruction Finance, and finally began 13 years with the Atomic Energy Commission, the first 10 as Deputy Director and the last three as Director of Finance.

"During my last 10 years with AEC we never had a GAO exception that stuck," says Ray. "We double-checked everything and cleaned it up before anybody did anything about it. That's the kind of shop I like to run. I'd like to make financial management here the best in the country."

What does he think about "this moon business" now?

"I believe we're going to make it now," he says, and as to his own job, "I'm having a ball. Sometimes it's what you call a frustrated ball, but I'm having a ball."

Ray and his wife Eleanor, formerly of Washington, D. C., have three children: Robert, 30, Mary, 18, and Margaret, 11. The older girl works for MSC in Procurement. The sixth member of the family is a Dachsund puppy named Lorelei, whose last name means "Ray" in German but which Ray can't remember. Ray's mother, now 87, also lives with the family.

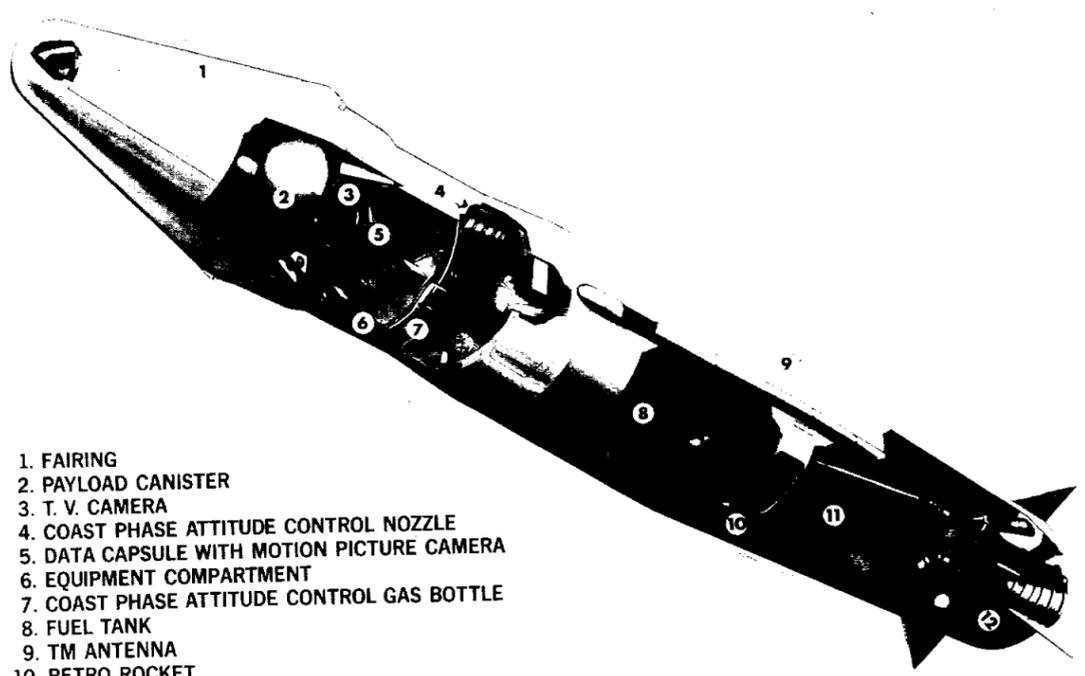
The Rays have bought a home in Memorial Park, which is far enough out so that Ray says, "My hobby is now working, and relaxing on the freeway."

Applesauce!

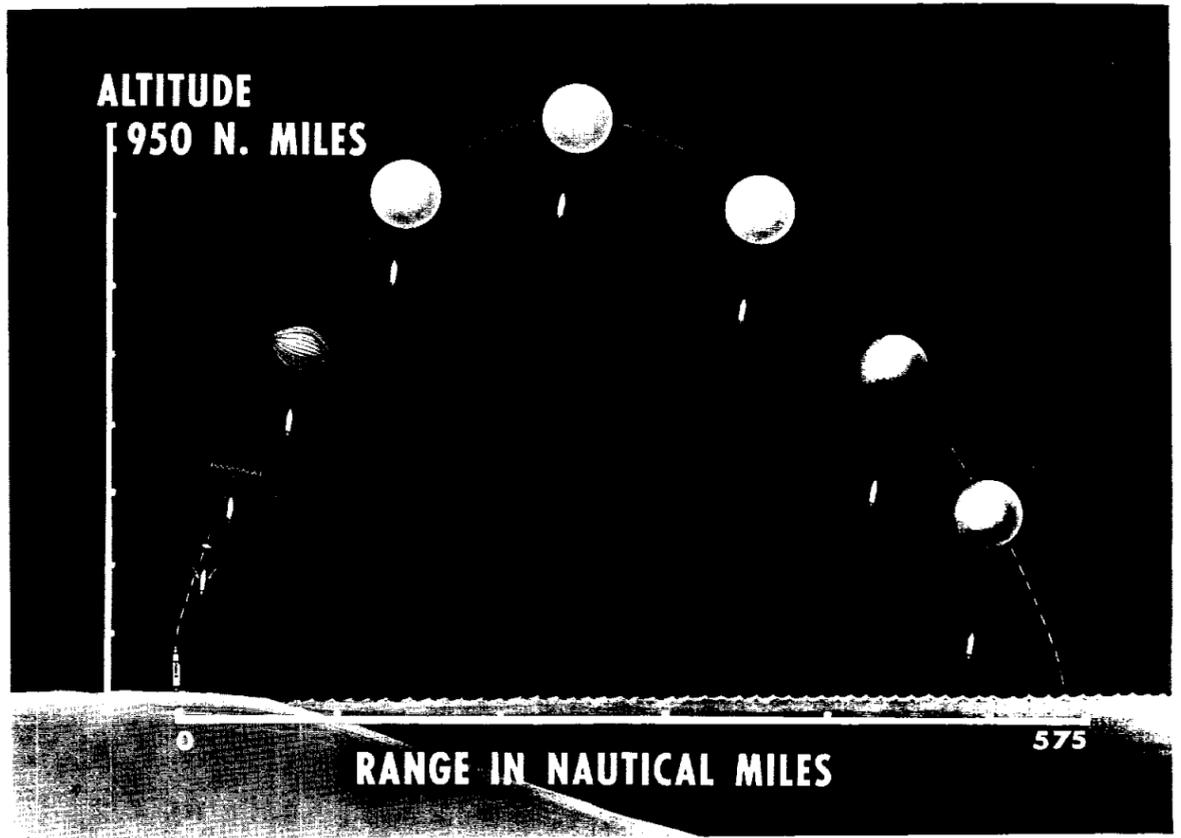
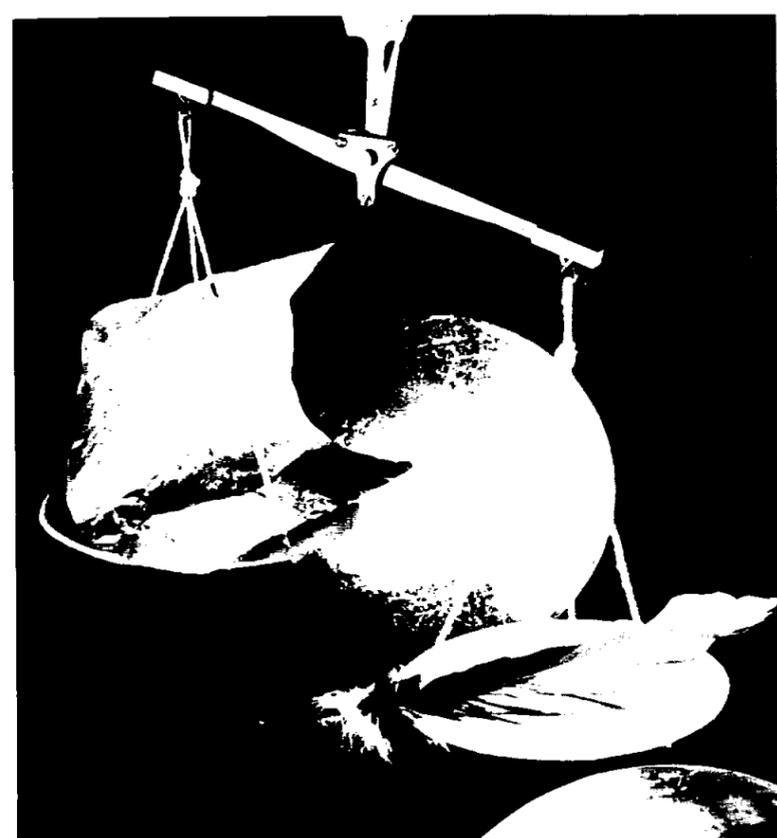
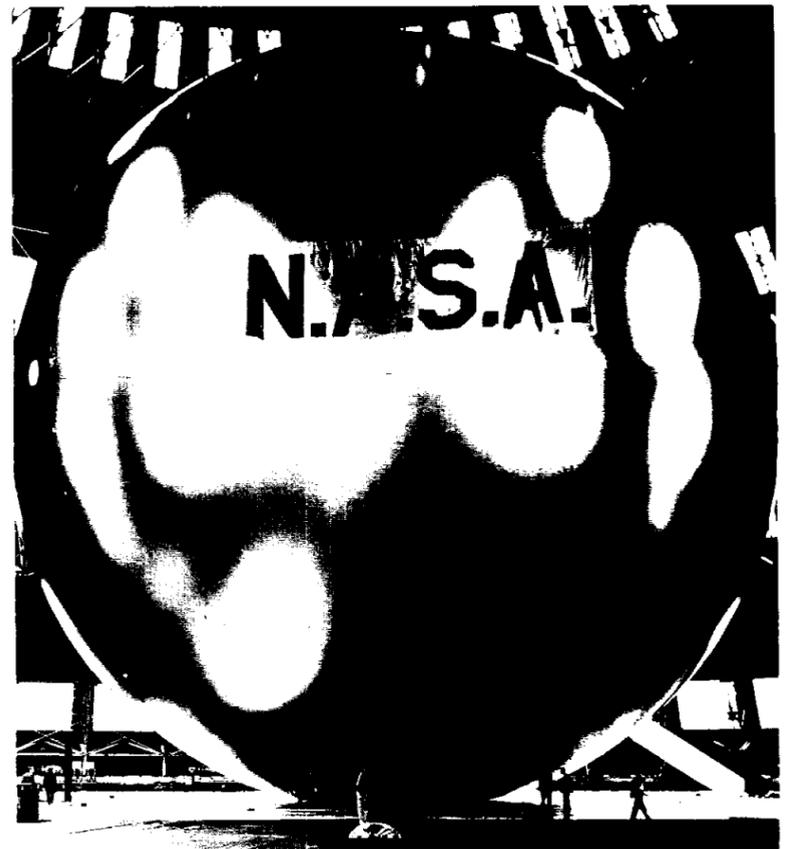
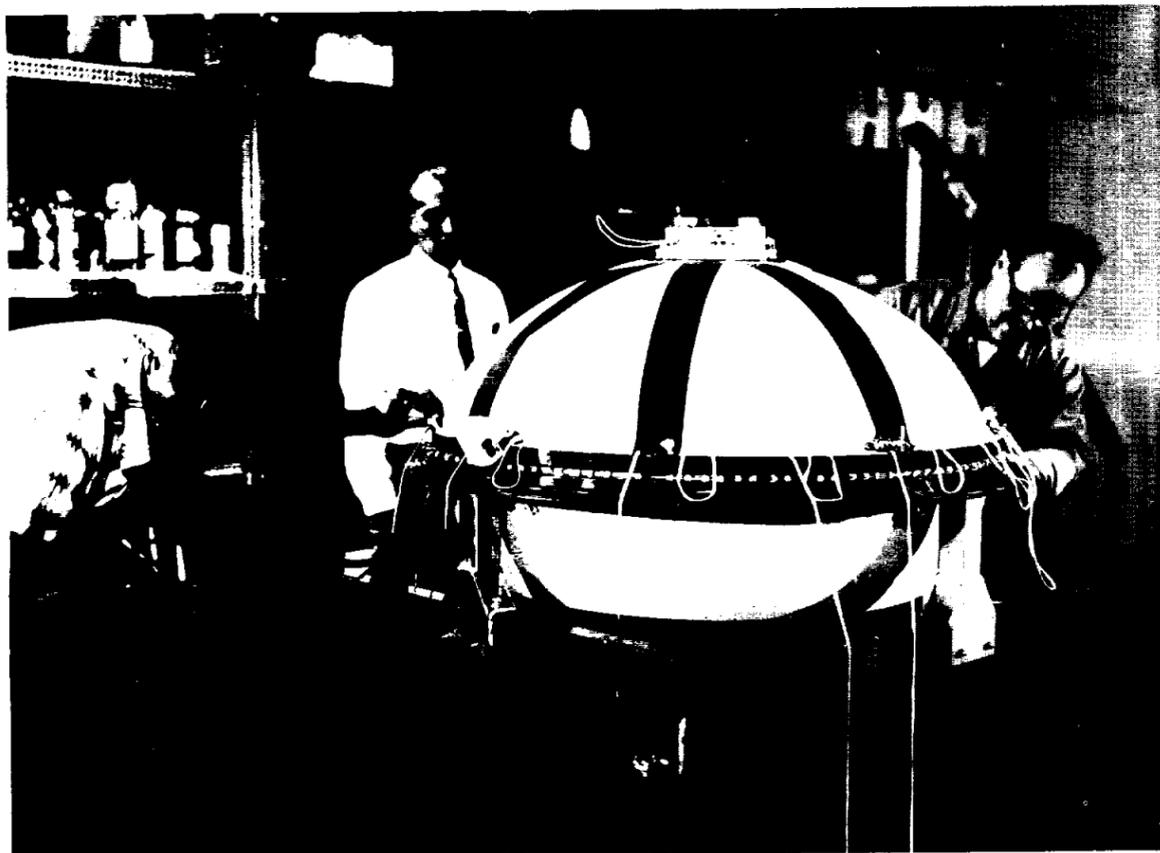
Apple products which once took three months coming around the Horn by clipper ship will circle the globe in considerably less time, according to a release from Duffy-Mott Company. Recently the 120-year old firm delivered 5,000 tubes of "space-food" to NASA for test and actual use in Project Mercury and allied programs. Some 1,550 of them were applesauce, 1,250 each were beef-and-vegetables and beef-and-gravy, and 950 were peaches.

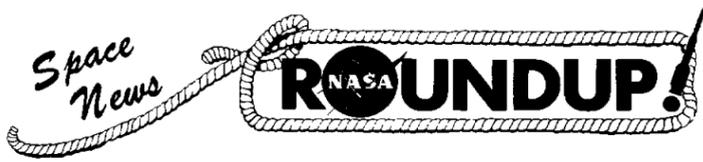
THOR VERTICAL TEST SPACE VEHICLE

EARLY ON THE MORNING of July 18 NASA successfully tested its second Echo passive communications satellite from Cape Canaveral using a modified system for inflating the 135-foot rigidized balloon. Echo II is to be launched on a 700-mile high polar orbit with a Thor Agena B late this year from the Pacific Missile Range. A TV camera and a high resolution motion picture camera mounted on a single stage Thor recorded the inflation process in this month's test about three minutes after launch at an altitude of 230 square miles. The 510-pound balloon reached an altitude of about 950 miles before it re-entered the atmosphere 600 miles downrange and burned up. A similar test in January failed when the balloon ripped apart, probably because of too rapid inflation. Echo 1, launched from Cape Canaveral August 1, 1960, has been viewed by millions of persons throughout the world since. At right is the Thor launch vehicle which carried Echo II into space last Wednesday. Below, left, technicians at the A & E building at Cape Canaveral prepare the 500-pound sphere with the satellite inside for launch. The sphere is made of two layers of aluminum foil, each .0017 inch thick, laminated to each side of a .00035 inch thick Mylar plastic film for a total thickness of .00069 inches. Both inner and outer surfaces are coated with alodine and the inner surface with black India ink for temperature control purposes. Below, right, the 13-story high balloon, fully inflated, dwarfs technicians beneath as it undergoes stress tests in a dirigible hanger at Weeksville, N. C. On the floor in foreground is the 41-inch canister into which it is packed during launch. At bottom, left, a piece of the balloon material is outweighed by a feather. At bottom, right, is an artists concept of the test flight trajectory, with the camera carrying Thor following.



- 1. FAIRING
- 2. PAYLOAD CANISTER
- 3. T. V. CAMERA
- 4. COAST PHASE ATTITUDE CONTROL NOZZLE
- 5. DATA CAPSULE WITH MOTION PICTURE CAMERA
- 6. EQUIPMENT COMPARTMENT
- 7. COAST PHASE ATTITUDE CONTROL GAS BOTTLE
- 8. FUEL TANK
- 9. TM ANTENNA
- 10. RETRO ROCKET
- 11. OXIDIZER TANK
- 12. MB-3 ENGINE





SECOND FRONT PAGE

First Building Contract To Be Let In November

A \$15 to \$20 million contract to build the main portion of the Manned Spacecraft Center at Clear Lake will be awarded in mid-November, Colonel R. P. West, district engineer of the U. S. Army Corps of Engineers, announced July 11.

It will include a \$4 million multi-story project management building at the main entrance to the site, off the Seabrook Loop Road, and the other principal buildings making up the main part of the center.

The finishing date will be January 1, 1964, although some facilities will be com-

pleted and occupied before then.

The project management building will be about nine stories high and include the administrative offices.

The contract will also include an auditorium, or "presentation building," west of the project management building to be used for technical meetings and also to house the public affairs and security offices.

Other principal installations included in the contract will be the spacecraft research laboratory and offices, the systems test and evaluation laboratories, a central data office, a flight operations office, and the technical services shops and offices.

The technical buildings will be situated at the north end of the area of buildings.

Col. West made the announcement shortly after presenting the specifications for an estimated \$5 million in support buildings and facilities to contractors in Fort Worth July 11.

Bids will be opened on this portion August 21 in Houston.

Included are such things as the heating and cooling plant, sewage disposal plant, a fire station, water treatment building, miscellaneous service buildings, and additional site development and utility work.

The site preparation work now going on is to be finished in September but work on the initial support buildings will begin before the current \$3.6 million contract with Morrison-Knudsen Company, Inc., and Paul Hardeman, Inc., ends.

Col. West said the plans involving the \$15 to \$20 million in buildings and laboratories will be released to potential bidders by October 1.

He added that it would be another six weeks before the bids are opened.

It was announced July 20 by James E. Webb, NASA Administrator, that sandwiched between these two contracts will be one for the Mission Control Center, which will monitor Gemini and Apollo Flights.

MSC Has Chunk Of Spending Bill Now In Congress

The \$3,820,515,250 spending authorization bill for the NASA in fiscal 1963, which the Senate approved July 11, included more than \$48 million for the Manned Spacecraft Center at Houston.

In addition, the center is authorized to receive portions of funds set aside for the manned space flight programs in which it will be involved but which are not segregated in the bill.

Actual appropriations of the money will be done in another bill, which could set some of the amounts at figures less than the authorizations.

A total of \$30,755,000 was included in the 1963 authorization for construction of facilities at the Center. This includes \$10,630,000 for construction of a large "high G" centrifuge or flight acceleration facility; \$6 million for thermochemical test facilities; \$6.5 Million for a lunar landing simulation facility, and \$7,625,000 for site development and utility installations.

The bill authorized \$17,999,750 for construction of manned space flight control centers, including the Apollo Mission Control Center to be built at Houston.

It has been estimated that the Apollo control center will cost about \$30 million.

Included in the fiscal year 1963 authorization was \$3,333,000 for rent, communications, and utilities. This was compared with \$1,707,000 for 1962 and \$639,875 in 1961.

The Senate committee report said current construction schedules call for completion of the first permanent buildings at the Manned Spacecraft Center in fiscal year 1964.

Tech Development To Furnish Models

Tech Development, Inc., a Dayton engineering concern, is playing its role in the man in space program, having received a contract from the McDonnell Aircraft Corporation, St. Louis, to furnish two research models of the Gemini two-man spacecraft.

These models will be fabricated from stainless steel and will be completely instrumented by Tech Development to provide skin temperature data during wind tunnel testing.

Microdot Gets Contract For Temperature Measurement

Microdot, Inc. has been awarded a \$148,750 contract for ninety channel temperature measuring systems for use in research and development of the three-man Apollo spacecraft. The systems are solid state designs of highly sophisticated measuring equipment.

Moon Flights To Be Controlled From Center Here, Says Webb

NASA Administrator James E. Webb, announced Friday that the Control Center for manned flights to the moon will be located at the National Aeronautics and Space Administration's Manned Spacecraft Center in Houston. This was the first official announcement from Washington on the control center location.

The mission control center will be used to control Gemini and Apollo operations just as the Mercury Control Center, Cape Canaveral, Fla. is the nerve center for Project Mercury flights.

In approving the recommendation of NASA Manned Space Flight director, D. Brainerd Holmes, and Manned Spacecraft Center Director, Robert R. Gilruth, Webb said, "Our experience in Project Mercury has demonstrated that there must be a continuous interchange of knowledge and information between project officials, operations officials, and the astronauts. They will be living and working at Houston,

and this will make the center continuously accessible to all involved in monitoring and directing preflight simulations as well as flight operations."

The Center, including its computer complex, communications center, flight simulations facility and flight operations displays, is planned to be operational in 1964 for Gemini rendezvous flights.

Philco Corporation, Palo Alto, California, is studying a design concept for the flight information and control functions of the Center under an April 1962 contract.

Construction supervision of the Center has been assigned by Manned Spacecraft Center to the U.S. Corps of Engineers.

The Center is expected to cost about \$30,000,000.

Service Emblems Awarded To Eligible MSC Employees

During the week of July 16 the Civilian Personnel Division began delivering to division and office chiefs honorary service emblems for those employees who became eligible for 1-, 10- and 15-year awards during the months of October 1961 through June 1962.

Congratulatory letters, from Dr. Gilruth, are also being delivered for those employees who became eligible for 20-year emblems during this period of time.

Those employees who received congratulatory letters will be presented the 20-year emblem and a certificate of service by the director, or persons designated by him, at our annual awards ceremony which is expected to be held in October.

Forty-nine employees were eligible for the one-year emblem, twenty-nine for the 10-year emblem, 15 for the 15-

year emblem and 31 for the 20-year emblem.

The honorary service emblem is a replica of the NASA insignia, a circular design depicting a sky background and a wing configuration, within which are the letters NASA, an elliptical flight path, and randomly placed stars. The one-year emblem is bronze, the 10-year emblem is silver, the 15-year emblem is gold, the 20-year emblem is gold and enamel with a ruby, the 30-year emblem is gold and enamel with an emerald and the 40-year emblem is gold and enamel with a diamond.

MIT Will Employ Honeywell Computer On Moon Problems

Honeywell Electronic Data Processing has announced that it will install an extremely powerful electronic computer at the instrumentation laboratory of Massachusetts Institute of Technology, where it will be used to handle a variety of complex research and development jobs connected with the navigation of America's first manned space ship to the moon.

The machine, a newly-developed Honeywell 1800, will be used by MIT on Project Apollo research tasks that require the capabilities of a very highspeed, advanced computer.

The computer will be installed at MIT in the third quarter of 1963, and is capable of performing 120,000 mathematical operations per second. Its magnetic tape system is capable of reading or writing 13,000 decimal digits a second. Its arithmetic unit operates at billionth-of-a-second (nanosecond) speeds.

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The Honeywell 1800 will be used to design the circuitry of the guidance computer that will be installed in the Apollo capsule to keep it on course. The Honeywell computer also will check out the machine logic and the guidance program of the space-borne computer, and simulate its full operation before its first trip to the moon.

It can calculate trajectories and make detailed studies of navigational procedures. It was explained that the computer probably will participate in most of the mathematical problems and calculations at MIT involved in Project Apollo.

Computer Course To Be Presented

In order to provide an understanding of computers, and a basic knowledge of the programming language, the Computation Division will make available courses in the theory and use of digital computers during the next few months.

Two types of courses are planned, one a brief orientation course lasting three days, for two hours each day, and including capabilities, applications and general information about computers.

The second is a detailed course in programming covering machine languages and coding techniques, compilers and more complex applications, to last three weeks for five hours each day.

Both courses will be taught by the members of the University of Houston, Texas A and M College and the Computation Division.

Mercury Models Seen Everywhere

Scale models of the Mercury spacecraft or some of the spacecraft themselves are being exhibited in 19 different locations this month, according to the Special Projects Division of the NASA Office of Educational Programs and Services.

Full scale Mercury craft were seen in Dahlgren, Va. and Chicago, Ill. and Anaheim, Cal. July 4 in various shows and fairs, and will appear later in Chicago again, Coatesville, Penna., Mason City, Iowa, Plattsburgh, N. Y., Belfast, Me., Columbia, S. C. Fort Fairfield, Me., Chicago a third time and Clearfield, Penna.

One-third scale Mercury spacecraft mockups were shown in Pittsburgh, Penna., Evansville, Ind., Lima, Ohio, Marion, Ind., Tampa, Fla. and Indianola, Iowa.